

# PATENT SPECIFICATION

(11)

1 452 169

1 452 169

(21) Application No. 16505/74 (22) Filed 16 April 1974

(23) Complete Specification filed 28 Oct. 1974

(44) Complete Specification published 13 Oct. 1976

(51) INT. CL.<sup>2</sup> A23K 3/02

(52) Index at acceptance  
A2B J3F2 J3G5

(72) Inventor RICHARD CHARLES CODMER



## (54) HAY PRESERVATIVES

- (71) We, FEED SERVICE (LIVESTOCK) LIMITED, a Company organised under the laws of Great Britain of 4, North Parade, Bath BA1 1LQ, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—
- 10 This invention relates to a method for protecting hay from decay, especially by mould, and to a composition for use therein.
- 15 Hay is often subject to decay during storage and many attempts have been made to find some means of preventing or inhibiting such decay. For example, it has been proposed to treat hay with acetic acid or propionic acid, but the effects of such substances are not as good as is desirable.
- 20 The present invention is based on the surprising discovery that the moulds which attack hay during storage can, in the particular conditions of temperature and humidity which generally apply during storage, be prevented or inhibited by the application of sorbic acid, especially when the latter is applied together with propionic acid and desirably other acids, and especially when the application is effected by spraying the hay with a liquid solution of the sorbic acid (preferably with propionic acid).
- 25 According to the invention we provide a method of protecting hay from decay comprising applying sorbic acid to the hay. Preferably the sorbic acid is in the form of a solution. In use, sorbic acid is usually applied in an amount of 0.4 lbs to 2.0 lbs per ton of hay.
- 30 The sorbic acid may for example be provided in the form of a concentrated (saturated) solution in propionic or n-butyric acid or in a mixture preferably containing equal parts by volume, of propionic acid and n-butyric acid. The composition may contain other desired ingredients such as formaldehyde, acetic acid, benzoic acid, iso-propanol, propylene glycol, an antioxidant such as butylated hydroxyanisole and a flavouring. The composition is generally to be applied to the hay in an amount of between 5 lbs and 30 lbs per ton. The lower recommended level while controlling the growth of fungi may not give complete control of bacterial growth.
- 35 The sorbic acid may be used in the concentrated solution in propionic acid containing for example from 4% to 24%, especially 8% to 14% by weight of sorbic acid. If the sorbic acid is used in a concentrated solution in equal parts of propionic acid and n-butyric acid it is preferably in an amount of 6% to 18%, more especially 10% to 12%.
- 40 A concentrated solution of sorbic acid in equal parts of propionic and n-butyric acid may be diluted for actual application with one or more of the above mentioned desired ingredients so that it contains, for example, 4% to 12% sorbic acid, 35% to 55% propionic acid, 35% to 55% n-butyric acid, 2% to 20% formaldehyde, 2% to 20% isopropyl alcohol, by weight. The solution would then be applied by a pressure spray apparatus in an amount of between 5 lbs and 30 lbs per ton of hay.
- 45 The invention is illustrated by the following example:
- Example*
- 50 All the organisms commonly occurring in mouldy hay, including actinomycetes, fungi and bacteria, were isolated and tested for their resistance against the anti-microbial activity of sorbic acid, propionic acid and n-butyric acid or any mixture of these products. Minimum inhibitory levels of the fatty acids needed totally to inhibit growth varied (depending on the organisms) between 0.1 and 1.6% for propionic acid,

SEE ERRATA SHEET ATTACHED

BEST AVAILABLE COPY

1 452 169

- (21) Application No. 16505/74 (22) Filed 16 April 1974  
 (23) Complete Specification filed 28 Oct. 1974  
 (44) Complete Specification published 13 Oct. 1976  
 (51) INT. CL.<sup>2</sup> A23K 3/02  
 (52) Index at acceptance  
 A2B J3F2 J3G5  
 (72) Inventor RICHARD CHARLES CODMER



## (54) HAY PRESERVATIVES

(71) We, FEED SERVICE (LIVESTOCK) LIMITED, a Company organised under the laws of Great Britain of 4, North Parade, Bath BA1 1LQ, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

10 This invention relates to a method for protecting hay from decay, especially by mould, and to a composition for use therein.

15 Hay is often subject to decay during storage and many attempts have been made to find some means of preventing or inhibiting such decay. For example, it has been proposed to treat hay with acetic acid or propionic acid, but the effects of such substances are not as good as is desirable.

20 The present invention is based on the surprising discovery that the moulds which attack hay during storage can, in the particular conditions of temperature and humidity which generally apply during storage, be prevented or inhibited by the application of sorbic acid, especially when the latter is applied together with propionic acid and desirably other acids, and especially when the application is effected by spraying the hay with a liquid solution of the sorbic acid (preferably with propionic acid).

35 According to the invention we provide a method of protecting hay from decay comprising applying sorbic acid to the hay. Preferably the sorbic acid is in the form of a solution. In use, sorbic acid is usually applied in an amount of 0.4 lbs to 2.0 lbs per ton of hay.

40 The sorbic acid may for example be provided in the form of a concentrated (saturated) solution in propionic or n-buty-

acid and n-butyric acid. The composition may contain other desired ingredients such as formaldehyde, acetic acid, benzoic acid, iso-propanol, propylene glycol, an anti-oxidant such as butylated hydroxyanisole and a flavouring. The composition is generally to be applied to the hay in an amount of between 5 lbs and 30 lbs per ton. The lower recommended level while controlling the growth of fungi may not give complete control of bacterial growth.

The sorbic acid may be used in the concentrated solution in propionic acid containing for example from 4% to 24%, especially 8% to 14% by weight of sorbic acid. If the sorbic acid is used in a concentrated solution in equal parts of propionic acid and n-butyric acid it is preferably in an amount of 6% to 18%, more especially 10% to 12%.

65 A concentrated solution of sorbic acid in equal parts of propionic and n-butyric acid may be diluted for actual application with one or more of the above mentioned desired ingredients so that it contains, for example, 4% to 12% sorbic acid, 35% to 55% propionic acid, 35% to 55% n-butyric acid, 2% to 20% formaldehyde, 2% to 20% isopropyl alcohol, by weight. The solution would then be applied by a pressure spray apparatus in an amount of between 5 lbs and 30 lbs per ton of hay.

The invention is illustrated by the following example:

*Example*

80 All the organisms commonly occurring in mouldy hay, including actinomycetes, fungi and bacteria, were isolated and tested for their resistance against the anti-microbial activity of sorbic acid, propionic acid and n-butyric acid or any mixture of these products. Minimum inhibitory levels of the fatty acids needed totally to inhibit growth

## ERRATUM

SPECIFICATION NO 1452169

Page 1, Heading (72) for CODMER read CODNER

THE PATENT OFFICE  
 11 March 1977

Bss 32895/6

BEST AVAILABLE COPY

0.05 and 0.4% for sorbic acid, 0.08 and 0.8 for the propionic acid and sorbic acid mixture, 0.1 and 0.6% for n-butyric acid, 0.08 and 0.6% for n-butyric acid and sorbic acid, and 0.1 and 0.4% for a mixture of all three acids, the percentages being percentages by weight of the composition.

WHAT WE CLAIM IS:—

- 10 1. A method for protecting hay from decay comprising applying sorbic acid to the hay.
2. A method according to claim 1 wherein the sorbic acid is applied in an amount of between 0.4 lbs and 2.0 lbs per ton of hay.
- 15 3. A method according to claim 1 or 2 wherein the sorbic acid is in the form of a solution.
4. A method according to any one of claims 1 to 3 wherein a composition is used comprising sorbic acid in admixture with propionic or n-butyric acid or a mixture thereof.
- 20 5. A method according to any one of claims 1 to 4 wherein the sorbic acid is in admixture with any one of formaldehyde, acetic acid, benzoic acid, iso propanol, propylene glycol, an antioxidant or a flavouring, or a mixture of any thereof.
- 30 6. A method according to claim 4 wherein the composition contains 4% to 24% by weight of the composition of sorbic acid when in admixture with propionic acid.
- 35 7. A method according to claim 4 wherein the composition contains 6% to 18% by weight of the composition of sorbic acid when in admixture with equal amounts of propionic and n-butyric acids.
- 40 8. A method according to claim 5 wherein a composition is used containing 4% to 12% sorbic acid, 35% to 55%

propionic acid, 35% to 55% butyric acid, 2% to 20% formaldehyde and 2% to 20% is-propyl alcohol and is applied by a pressure spray apparatus in an amount of between 5 lbs and 30 lbs per ton of hay, the percentages being percentages by weight of the composition.

9. A method according to any one of claims 1 to 7 wherein the sorbic acid or composition thereof is applied by spraying.

10. A method according to any one of claims 4 to 7 and claim 9 wherein the composition is applied in an amount of 5 lbs to 30 lbs per ton of hay.

11. A composition when used in a method according to any one of claims 1 to 10 comprising sorbic acid in admixture with propionic acid or n-butyric acid or a mixture thereof.

12. A composition for use in a method according to any one of claims 1 to 10 comprising sorbic acid in admixture with propionic acid and n-butyric acid.

13. A composition according to claim 11 or 12 wherein propionic acid and butyric acid are present in equal amounts.

14. A composition as according to any of claims 11 to 13 wherein there is present any one of formaldehyde, acetic acid, benzoic acid, iso-propanol, propylene glycol, an anti-oxidant or a flavouring, or a mixture of any thereof.

15. A composition according to any one of claims 11 to 14 containing 4% to 24% by weight of sorbic acid.

16. A composition according to claim 12 substantially as hereinbefore described.

For the Applicants,  
CARPMAELS & RANSFORD,  
Chartered Patent Agents,  
43 Bloomsbury Square,  
London WC1A 2RA .